

SEQUENCE LISTING



<110> DENEFLÉ, Patrice  
 ROSIER-MONTUS, Marie-Francoise  
 PRADES, Catherine  
 ARNOULD-REGUIGNE, Isabelle  
 DUVERGER, Nicolas  
 ALLIKMETS, Rando  
 DEAN, Michael

<120> NUCLEIC ACIDS OF THE HUMAN ABCA5, ABCA6, ABCA9, AND ABCA10 GENES, VECTORS  
 CONTAINING SUCH NUCLEIC ACIDS, AND USES THEREOF

<130> ABCA5, 6, 9, 10

<140> US 10/005,338

<141> 2001-12-07

<150> US 60/263,231

<151> 2001-01-23

<150> FR 00403440.1

<151> 2000-12-07

<160> 217

<170> PatentIn Ver. 2.1

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 Ile Ser Met Met His Pro Asn Lys Lys Tyr Glu Glu Val Pro Asn Ile  
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 Glu Leu Asn Pro Met Asp Lys Phe Thr Leu Ser Asn Leu Ile Leu Gly  
 65 70 75 80  
 Tyr Thr Pro Val Thr Asn Ile Thr Ser Ser Ile Met Gln Lys Val Ser  
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 Thr Asp His Leu Pro Asp Val Ile Ile Thr Glu Glu Tyr Thr Asn Glu  
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 Lys Glu Met Leu Thr Ser Ser Leu Ser Lys Pro Ser Asn Phe Val Gly  
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 Val Val Phe Lys Asp Ser Met Ser Tyr Glu Leu Arg Phe Phe Pro Asp  
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 Met Ile Pro Val Ser Ser Ile Tyr Met Asp Ser Arg Ala Gly Cys Ser  
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 Lys Ser Cys Glu Ala Ala Gln Tyr Trp Ser Ser Gly Phe Thr Val Leu  
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 Gln Ala Ser Ile Asp Ala Ala Ile Ile Gln Leu Lys Thr Asn Val Ser  
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 Leu Trp Lys Glu Leu Glu Ser Thr Lys Ala Val Ile Met Gly Glu Thr  
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Ala Val Val Glu Ile Asp Thr Phe Pro Arg Gly Val Ile Leu Ile Tyr  
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 Leu Val Ile Ala Phe Ser Pro Phe Gly Tyr Phe Leu Ala Ile His Ile  
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 Val Ala Glu Lys Glu Lys Lys Ile Lys Glu Phe Leu Lys Ile Met Gly  
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 Leu His Asp Thr Ala Phe Trp Leu Ser Trp Val Leu Leu Tyr Thr Ser  
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 Leu Leu Phe Pro Gln Ser Ser Ser Ile Val Ile Phe Leu Leu Phe Phe  
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 Ala Phe Gly Phe Ile Gly Leu Met Ile Ile Leu Ile Glu Ser Phe Pro  
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 Lys Ser Leu Val Trp Leu Phe Ser Pro Phe Cys His Cys Thr Phe Val  
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 Ser Phe Ser Asn Leu Thr Ala Gly Pro Tyr Pro Leu Ile Ile Thr Ile  
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 Tyr Phe Leu Lys Pro Ser Tyr Trp Ser Lys Ser Lys Arg Asn Tyr Glu  
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 Glu Leu Ser Glu Gly Asn Val Asn Gly Asn Ile Ser Phe Ser Glu Ile  
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Val	Phe	Thr	Gln	Gln	Pro	Leu	Glu	Glu	Glu	Met	Asp	Ser	Lys	Ser	Phe	
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Asp	Glu	Met	Glu	Gln	Ser	Leu	Leu	Ile	Leu	Ser	Glu	Thr	Lys	Ala	Ser	
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Lys	Phe	His	Phe	Phe	Thr	Leu	Lys	Arg	Glu	Ser	Lys	Ser	Val	Arg	Ser	
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Val	Leu	Leu	Leu	Leu	Leu	Ile	Phe	Phe	Thr	Val	Gln	Ile	Phe	Met	Phe	
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 Ser Asp Tyr Val Ser Val Ala Pro His Ser Ala Ala Leu Asn Val Met  
 945 950 955 960  
 His Ser Glu Lys Asp Tyr Val Phe Ala Ala Val Phe Asn Ser Thr Met  
 965 970 975  
 Val Tyr Ser Leu Pro Ile Leu Val Asn Ile Ile Ser Asn Tyr Tyr Leu  
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Gly Gly Arg Ser Ile Arg Lys Asp Pro Phe Phe Arg Asn Leu Ser Thr  
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 His Leu Gln Lys Thr Val Lys Lys Leu Pro Ala Gly Ile Lys Arg Lys  
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 Gly Arg Val Asp Lys Phe Asn Ser Ser Ser Leu Met Val Val Tyr Thr  
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 Gly Glu Phe Ser Cys Thr Leu Thr Lys Tyr Trp Asn Arg Gly Phe Val  
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 His Pro Val Met Glu Glu Leu Met Ser Val Thr Ala Ile Thr Met Lys  
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 Gly Leu Ser Val Pro Thr Glu Gly Ser Val Thr Ile Tyr Asn Lys Asn  
 530 535 540  
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 545 550 555 560  
 Cys Pro Gln Phe Asn Val Gln Phe Asp Ile Leu Thr Val Lys Glu Asn

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Gln	Glu	Val 595	Gln	Arg	Ile	Leu	Leu 600	Glu	Leu	Asp	Met	Gln 605	Asn	Ile	Gln				
Asp	Asn 610	Leu	Ala	Lys	His	Leu 615	Ser	Glu	Gly	Gln	Lys 620	Arg	Lys	Leu	Thr				
Phe 625	Gly	Ile	Thr	Ile	Leu 630	Gly	Asp	Pro	Gln	Ile 635	Leu	Leu	Leu	Asp	Glu 640				
Pro	Thr	Thr	Gly	Leu 645	Asp	Pro	Phe	Ser	Arg 650	Asp	Gln	Val	Trp	Ser 655	Leu				
Leu	Arg	Glu	Arg 660	Arg	Ala	Asp	His	Val 665	Ile	Leu	Phe	Ser	Thr 670	Gln	Ser				
Met	Asp	Glu 675	Ala	Asp	Ile	Leu	Ala 680	Asp	Arg	Lys	Val	Ile 685	Met	Ser	Asn				
Gly	Arg 690	Leu	Lys	Cys	Ala	Gly 695	Ser	Ser	Met	Phe	Leu 700	Lys	Arg	Arg	Trp				
Gly 705	Leu	Gly	Tyr	His	Leu 710	Ser	Leu	His	Arg	Asn 715	Glu	Ile	Cys	Asn	Pro 720				
Glu	Gln	Ile	Thr	Ser 725	Phe	Ile	Thr	His	His 730	Ile	Pro	Asp	Ala	Lys 735	Leu				
Lys	Thr	Glu	Asn 740	Lys	Glu	Lys	Leu	Val 745	Tyr	Thr	Leu	Pro	Leu 750	Glu	Arg				
Thr	Asn 755	Thr	Phe	Pro	Asp	Leu	Phe 760	Ser	Asp	Leu	Asp	Lys 765	Cys	Ser	Asp				
Gln	Gly 770	Val	Thr	Gly	Tyr	Asp 775	Ile	Ser	Met	Ser	Thr 780	Leu	Asn	Glu	Val				
Phe 785	Met	Lys	Leu	Glu	Gly 790	Gln	Ser	Thr	Ile	Glu 795	Gln	Asp	Phe	Glu	Gln 800				
Val	Glu	Met	Ile	Arg 805	Asp	Ser	Glu	Ser	Leu 810	Asn	Glu	Met	Glu	Leu 815	Ala				
His	Ser	Ser	Phe 820	Ser	Glu	Met	Gln	Thr 825	Ala	Val	Ser	Asp	Met 830	Gly	Leu				
Trp	Arg	Met 835	Gln	Val	Phe	Ala	Met 840	Ala	Arg	Leu	Arg	Phe 845	Leu	Lys	Leu				
Lys	Arg 850	Gln	Thr	Lys	Val	Leu 855	Leu	Thr	Leu	Leu	Leu 860	Val	Phe	Gly	Ile				
Ala 865	Ile	Phe	Pro	Leu	Ile 870	Val	Glu	Asn	Ile	Ile 875	Tyr	Ala	Met	Leu	Asn 880				
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 Ile Leu Leu Glu Val Asp Asp Phe Glu Asn Arg Asn Gly Thr Asp Gly  
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 Leu Ser Tyr Asn Gly Ala Ile Ile Val Ser Gly Lys Gln Lys Asp Tyr  
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 Arg Phe Ser Val Val Cys Asn Thr Lys Arg Leu His Cys Phe Pro Ile  
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 Ser Ile Leu Ile Thr Thr Met Val Leu Val Pro Ser Tyr Thr Leu Leu  
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 Gly Phe Lys Thr Phe Leu Glu Val Arg Asp Gln Glu His Tyr Arg Glu  
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 Glu Trp Leu Phe Ser Phe Leu Leu Val Leu Phe Leu Tyr Leu Phe Phe  
                                   35                                  40                                  45  
 Ser Asn Leu His Gln Val His Asp Thr Pro Gln Met Ser Ser Met Asp  
                                   50                                  55                                  60  
 Leu Gly Arg Val Asp Ser Phe Asn Asp Thr Asn Tyr Val Ile Ala Phe  
   65                                  70                                  75                                  80  
 Ala Pro Glu Ser Lys Thr Thr Gln Glu Ile Met Asn Lys Val Ala Ser  
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 Ala Pro Phe Leu Lys Gly Arg Thr Ile Met Gly Trp Pro Asp Glu Lys  
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 Ser Met Asp Glu Leu Asp Leu Asn Tyr Ser Ile Asp Ala Val Arg Val  
                                   115                                  120                                  125  
 Ile Phe Thr Asp Thr Phe Ser Tyr His Leu Lys Phe Ser Trp Gly His  
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 Arg Ile Pro Met Met Lys Glu His Arg Asp His Ser Ala His Cys Gln  
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 Ala Val Asn Glu Lys Met Lys Cys Glu Gly Ser Glu Phe Trp Glu Lys  
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 Gly Phe Val Ala Phe Gln Ala Ala Ile Asn Ala Ala Ile Ile Glu Ile  
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 Ala Thr Asn His Ser Val Met Glu Gln Leu Met Ser Val Thr Gly Val  
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 His Met Lys Ile Leu Pro Phe Val Ala Gln Gly Gly Val Ala Thr Asp  
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 Phe Phe Ile Phe Phe Cys Ile Ile Ser Phe Ser Thr Phe Ile Tyr Tyr  
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 Val Ser Val Asn Val Thr Gln Glu Arg Gln Tyr Ile Thr Ser Leu Met  
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Thr Met Met Gly Leu Arg Glu Ser Ala Phe Trp Leu Ser Trp Gly Leu  
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 Met Tyr Ala Gly Phe Ile Leu Ile Met Ala Thr Leu Met Ala Leu Ile  
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 Val Lys Ser Ala Gln Ile Val Val Leu Thr Gly Phe Val Met Val Phe  
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 Thr Leu Phe Leu Leu Tyr Gly Leu Ser Leu Ile Thr Leu Ala Phe Leu  
 305 310 315 320  
 Met Ser Val Leu Ile Lys Lys Pro Phe Leu Thr Gly Leu Val Val Phe  
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 Leu Leu Ile Val Phe Trp Gly Ile Leu Gly Phe Pro Ala Leu Tyr Thr  
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 His Leu Pro Ala Phe Leu Glu Trp Thr Leu Cys Leu Leu Ser Pro Phe  
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 Ala Phe Thr Val Gly Met Ala Gln Leu Ile His Leu Asp Tyr Asp Val  
 370 375 380  
 Asn Ser Asn Ala His Leu Asp Ser Ser Gln Asn Pro Tyr Leu Ile Ile  
 385 390 395 400  
 Ala Thr Leu Phe Met Leu Val Phe Asp Thr Leu Leu Tyr Leu Val Leu  
 405 410 415  
 Thr Leu Tyr Phe Asp Lys Ile Leu Pro Ala Glu Tyr Gly His Arg Cys  
 420 425 430  
 Ser Pro Leu Phe Phe Leu Lys Ser Cys Phe Trp Phe Gln His Gly Arg  
 435 440 445  
 Ala Asn His Val Val Leu Glu Asn Glu Thr Asp Ser Asp Pro Thr Pro  
 450 455 460  
 Asn Asp Cys Phe Glu Pro Val Ser Pro Glu Phe Cys Gly Lys Glu Ala  
 465 470 475 480  
 Ile Arg Ile Lys Asn Leu Lys Lys Glu Tyr Ala Gly Lys Cys Glu Arg  
 485 490 495  
 Val Glu Ala Leu Lys Gly Val Val Phe Asp Ile Tyr Glu Gly Gln Ile  
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 Thr Ala Leu Leu Gly His Ser Gly Ala Gly Lys Thr Thr Leu Leu Asn  
 515 520 525  
 Ile Leu Ser Gly Leu Ser Val Pro Thr Ser Gly Ser Val Thr Val Tyr  
 530 535 540  
 Asn His Thr Leu Ser Arg Met Ala Asp Ile Glu Asn Ile Ser Lys Phe  
 545 550 555 560  
 Thr Gly Phe Cys Pro Gln Ser Asn Val Gln Phe Gly Phe Leu Thr Val  
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 Lys Glu Asn Leu Arg Leu Phe Ala Lys Ile Lys Gly Ile Leu Pro His  
 580 585 590  
 Glu Val Glu Lys Glu Val Gln Arg Val Val Gln Glu Leu Glu Met Glu

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Asn	Ile	Gln	Asp	Ile	Leu	Ala	Gln	Asn	Leu	Ser	Gly	Gly	Gln	Asn	Arg
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Lys	Leu	Thr	Phe	Gly	Ile	Ala	Ile	Leu	Gly	Asp	Pro	Gln	Val	Leu	Leu
625					630					635					640
Leu	Asp	Glu	Pro	Thr	Ala	Gly	Leu	Asp	Pro	Leu	Ser	Arg	His	Arg	Ile
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Trp	Asn	Leu	Leu	Lys	Glu	Gly	Lys	Ser	Asp	Arg	Val	Ile	Leu	Phe	Ser
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Thr	Gln	Phe	Ile	Asp	Glu	Ala	Asp	Ile	Leu	Ala	Asp	Arg	Lys	Val	Phe
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Ile	Ser	Asn	Gly	Lys	Leu	Lys	Cys	Ala	Gly	Ser	Ser	Leu	Phe	Leu	Lys
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Lys	Lys	Trp	Gly	Ile	Gly	Tyr	His	Leu	Ser	Leu	His	Leu	Asn	Glu	Arg
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Cys	Asp	Pro	Glu	Ser	Ile	Thr	Ser	Leu	Val	Lys	Gln	His	Ile	Ser	Asp
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Ala	Lys	Leu	Thr	Ala	Gln	Ser	Glu	Glu	Lys	Leu	Val	Tyr	Ile	Leu	Pro
			740					745					750		
Leu	Glu	Arg	Thr	Asn	Lys	Phe	Pro	Glu	Leu	Tyr	Arg	Asp	Leu	Asp	Arg
		755					760					765			
Cys	Ser	Asn	Gln	Gly	Ile	Glu	Asp	Tyr	Gly	Val	Ser	Ile	Thr	Thr	Leu
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Asn	Glu	Val	Phe	Leu	Lys	Leu	Glu	Gly	Lys	Ser	Thr	Ile	Asp	Glu	Ser
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Asp	Ile	Gly	Ile	Trp	Gly	Gln	Leu	Gln	Thr	Asp	Gly	Ala	Lys	Asp	Ile
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Gly	Ser	Leu	Val	Glu	Leu	Glu	Gln	Val	Leu	Ser	Ser	Phe	His	Glu	Thr
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Ile	Ala	Lys	Val	Arg	Phe	Leu	Lys	Leu	Lys	Lys	Glu	Arg	Lys	Ser	Leu
	850					855					860				
Trp	Thr	Ile	Leu	Leu	Leu	Phe	Gly	Ile	Ser	Phe	Ile	Pro	Gln	Leu	Leu
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Glu	His	Leu	Phe	Tyr	Glu	Ser	Tyr	Gln	Lys	Ser	Tyr	Pro	Trp	Glu	Leu
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Ser	Pro	Asn	Thr	Tyr	Phe	Leu	Ser	Pro	Gly	Gln	Gln	Pro	Gln	Asp	Pro
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Leu	Thr	His	Leu	Leu	Val	Ile	Asn	Lys	Thr	Gly	Ser	Thr	Ile	Asp	Asn
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Phe	Leu	His	Ser	Leu	Arg	Arg	Gln	Asn	Ile	Ala	Ile	Glu	Val	Asp	Ala
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965 970 975  
Thr Lys Arg Leu Asn Cys Phe Pro Val Leu Leu Asp Val Ile Ser Asn  
980 985 990  
Gly Leu Leu Gly Ile Phe Asn Ser Ser Glu His Ile Gln Thr Asp Arg  
995 1000 1005  
Ser Thr Phe Phe Glu Glu His Met Asp Tyr Glu Tyr Gly Tyr Arg Ser  
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Asn Thr Phe Phe Trp Ile Pro Met Ala Ala Ser Phe Thr Pro Tyr Ile  
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Asp Tyr Ile Phe Ser Pro Glu Glu Ile Ile Phe Ile Ile Gln Asn Leu  
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Leu Ile Gln Ile Leu Cys Ser Ile Gly Tyr Val Ser Ser Leu Val Phe  
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Leu Thr Tyr Val Ile Ser Phe Ile Phe Arg Asn Gly Arg Lys Asn Ser  
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Gly Ile Trp Ser Phe Phe Phe Leu Ile Val Val Ile Phe Ser Ile Val  
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Met Leu Ile Pro Pro Phe Thr Leu Ile Gly Ser Leu Phe Ile Phe Ser  
1170 1175 1180  
Glu Ile Ser Pro Asp Ser Met Asp Tyr Leu Gly Ala Ser Glu Ser Glu  
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Ile Val Tyr Leu Ala Leu Leu Ile Pro Tyr Leu His Phe Leu Ile Phe  
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Leu Phe Ile Leu Arg Cys Leu Glu Met Asn Cys Arg Lys Lys Leu Met  
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Arg Lys Asp Pro Val Phe Arg Ile Ser Pro Arg Ser Asn Ala Ile Phe  
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Pro Asn Pro Glu Glu Pro Glu Gly Glu Glu Glu Asp Ile Gln Met Glu  
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1265 1270 1275 1280

Pro Val Ile Ile Ala Ser Cys Leu Arg Lys Glu Tyr Ala Gly Lys Lys  
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 Ser Phe Cys Val Lys Lys Gly Glu Val Ile Gly Leu Leu Gly His Asn  
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 Gly Ala Gly Lys Ser Thr Thr Ile Lys Met Ile Thr Gly Asp Thr Lys  
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 Pro Thr Ala Gly Gln Val Ile Leu Lys Gly Ser Gly Gly Gly Glu Pro  
 1345 1350 1355 1360  
 Leu Gly Phe Leu Gly Tyr Cys Pro Gln Glu Asn Ala Leu Trp Pro Asn  
 1365 1370 1375  
 Leu Thr Val Arg Gln His Leu Glu Val Tyr Ala Ala Val Lys Gly Leu  
 1380 1385 1390  
 Arg Lys Gly Asp Ala Met Ile Ala Ile Thr Arg Leu Val Asp Ala Leu  
 1395 1400 1405  
 Lys Leu Gln Asp Gln Leu Lys Ala Pro Val Lys Thr Leu Ser Glu Gly  
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 Ile Lys Arg Lys Leu Arg Phe Val Leu Ser Ile Leu Gly Asn Pro Ser  
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 Val Val Leu Leu Asp Glu Pro Ser Thr Gly Met Asp Pro Glu Gly Gln  
 1445 1450 1455  
 Gln Gln Met Trp Gln Val Ile Arg Ala Thr Phe Arg Asn Thr Glu Arg  
 1460 1465 1470  
 Gly Ala Leu Leu Thr Thr His Tyr Met Ala Glu Ala Glu Ala Val Cys  
 1475 1480 1485  
 Asp Arg Val Ala Ile Met Val Ser Gly Arg Leu Arg Cys Ile Gly Ser  
 1490 1495 1500  
 Ile Gln His Leu Lys Ser Lys Phe Gly Lys Asp Tyr Leu Leu Glu Met  
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 Lys Leu Lys Asn Leu Ala Gln Met Glu Pro Leu His Ala Glu Ile Leu  
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 Arg Leu Phe Pro Gln Ala Ala Gln Gln Glu Arg Phe Ser Ser Leu Met  
 1540 1545 1550  
 Val Tyr Lys Leu Pro Val Glu Asp Val Arg Pro Leu Ser Gln Ala Phe  
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 Phe Lys Leu Glu Ile Val Lys Gln Ser Phe Asp Leu Glu Glu Tyr Ser  
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 Leu Ser Gln Ser Thr Leu Glu Gln Val Phe Leu Glu Leu Ser Lys Glu  
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 Lys Leu Leu Leu Gln Glu Glu Pro



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 <213> Homo sapiens

<220>  
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<400> 8

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His Glu Met Val Gly Val Ile Phe Ser Asp Thr Phe Ser Tyr Arg Leu
          35          40          45
Lys Phe Asn Trp Gly Tyr Arg Ile Pro Val Ile Lys Glu His Ser Glu
          50          55          60
Tyr Thr Glu His Cys Trp Ala Met His Gly Glu Ile Phe Cys Tyr Leu
          65          70          75          80
Ala Lys Tyr Trp Leu Lys Gly Phe Val Ala Phe Gln Ala Ala Ile Asn
          85          90          95
Ala Ala Ile Ile Glu Val Thr Thr Asn His Ser Val Met Glu Glu Leu
          100          105          110
Thr Ser Val Ile Gly Ile Asn Met Lys Ile Pro Pro Phe Ile Ser Lys
          115          120          125
Gly Glu Ile Met Asn Glu Trp Phe His Phe Thr Cys Leu Val Ser Phe
          130          135          140
Ser Ser Phe Ile Tyr Phe Ala Ser Leu Asn Val Ala Arg Glu Arg Gly
          145          150          155          160
Lys Phe Lys Lys Leu Met Thr Val Met Gly Leu Arg Glu Ser Ala Phe
          165          170          175
Trp Leu Ser Trp Xaa Leu Thr Tyr Ile Cys Phe Ile Phe Ile Met Ser
          180          185          190
Ile Phe Met Ala Leu Val Ile Thr Ser Ile Ser Ile Val Phe His Thr
          195          200          205
Gly Phe Met Val Ile Phe Thr Leu Tyr Ser Leu Tyr Gly Leu Ser Leu
          210          215          220
Ile Ala Leu Ala Phe Leu Met Ser Val Leu Ile Arg Lys Pro Met Leu
          225          230          235          240
Ala Gly Leu Ala Gly Phe Leu Phe Thr Val Phe Trp Gly Cys Leu Gly
          245          250          255
Phe Thr Val Leu Tyr Arg Gln Leu Pro Leu Ser Leu Gly Trp Val Leu
          260          265          270

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Ser Leu Leu Ser Pro Phe Ala Phe Thr Ala Gly Met Ala Gln Val Thr  
 275 280 285  
 His Leu Asp Asn Tyr Leu Ser Gly Val Ile Phe Pro Asp Pro Ser Gly  
 290 295 300  
 Asp Ser Tyr Lys Met Ile Ala Thr Phe Phe Ile Leu Ala Phe Asp Thr  
 305 310 315 320  
 Leu Phe Tyr Leu Ile Phe Thr Leu Tyr Phe Glu Arg Val Leu Pro Asp  
 325 330 335  
 Lys Asp Gly His Gly Asp Ser Pro Leu Phe Phe Leu Lys Ser Ser Phe  
 340 345 350  
 Trp Ser Lys His Gln Asn Thr His His Glu Ile Phe Glu Asn Glu Ile  
 355 360 365  
 Asn Pro Glu His Ser Ser Asp Asp Ser Phe Glu Pro Val Ser Pro Glu  
 370 375 380  
 Phe His Gly Lys Glu Ala Ile Arg Ile Arg Asn Val Ile Lys Glu Tyr  
 385 390 395 400  
 Asn Gly Lys Thr Gly Lys Val Glu Ala Leu Gln Gly Ile Phe Phe Asp  
 405 410 415  
 Ile Tyr Glu Gly Gln Ile Thr Ala Ile Leu Gly His Asn Gly Ala Gly  
 420 425 430  
 Lys Ser Thr Leu Leu Asn Ile Leu Ser Gly Leu Ser Val Ser Thr Glu  
 435 440 445  
 Gly Ser Ala Thr Ile Tyr Asn Thr Gln Leu Ser Glu Ile Thr Asp Met  
 450 455 460  
 Glu Glu Ile Arg Lys Asn Ile Gly Phe Cys Pro Gln Phe Asn Phe Gln  
 465 470 475 480  
 Phe Asp Phe Leu Thr Val Arg Glu Asn Leu Arg Val Phe Ala Lys Ile  
 485 490 495  
 Lys Gly Ile Gln Pro Lys Glu Val Glu Gln Glu Val Lys Arg Ile Ile  
 500 505 510  
 Met Glu Leu Asp Met Gln Ser Ile Gln Asp Ile Ile Ala Lys Lys Leu  
 515 520 525  
 Ser Gly Gly Gln Lys Arg Lys Leu Thr Leu Gly Ile Ala Ile Leu Gly  
 530 535 540  
 Asp Pro Gln Val Leu Leu Leu Asp Glu Pro Thr Ala Gly Leu Asp Pro  
 545 550 555 560  
 Phe Ser Arg His Arg Val Trp Ser Leu Leu Lys Glu His Lys Val Asp  
 565 570 575  
 Arg Leu Ile Leu Phe Ser Thr Gln Phe Met Asp Glu Ala Asp Ile Leu  
 580 585 590  
 Ala Asp Arg Lys Val Phe Leu Ser Asn Gly Lys Leu Lys Cys Ala Gly  
 595 600 605

Ser Ser Leu Phe Leu Lys Arg Lys Trp Gly Ile Gly Tyr His Leu Ser  
 610 615 620  
 Leu His Arg Asn Glu Met Cys Asp Thr Glu Lys Ile Thr Ser Leu Ile  
 625 630 635 640  
 Lys Gln His Ile Pro Asp Ala Lys Leu Thr Thr Glu Ser Glu Glu Lys  
 645 650 655  
 Leu Val Tyr Ser Leu Pro Leu Glu Lys Thr Asn Lys Phe Pro Asp Leu  
 660 665 670  
 Tyr Ser Asp Leu Asp Lys Cys Ser Asp Gln Gly Ile Arg Asn Tyr Ala  
 675 680 685  
 Val Ser Val Thr Ser Leu Asn Glu Val Phe Leu Asn Leu Glu Gly Lys  
 690 695 700  
 Ser Ala Ile Asp Glu Pro Asp Phe Asp Ile Gly Lys Gln Glu Lys Ile  
 705 710 715 720  
 His Val Thr Arg Asn Thr Gly Asp Glu Ser Glu Met Glu Gln Val Leu  
 725 730 735  
 Cys Ser Leu Pro Glu Thr Arg Lys Ala Val Ser Ser Ala Ala Leu Trp  
 740 745 750  
 Arg Arg Gln Ile Tyr Ala Val Ala Thr Leu Arg Phe Leu Lys Leu Arg  
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 Arg Glu Arg Arg Ala Leu Leu Cys Leu Leu Leu Val Leu Gly Ile Ala  
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 Phe Ile Pro Ile Ile Leu Glu Lys Ile Met Tyr Lys Val Thr Arg Glu  
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 Thr His Cys Trp Glu Phe Ser Pro Ser Met Tyr Phe Leu Ser Leu Glu  
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 Gly Ser Asn Ile Glu Asp Leu Val His Ser Leu Lys Cys Gln Asp Ile  
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 Ser Tyr Asn Gly Ala Ile Ile Val Ser Gly Asp Gln Lys Asp Tyr Arg  
 865 870 875 880  
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 Met Gly Ile Val Ser Asn Ala Leu Met Gly Ile Phe Asn Phe Thr Glu  
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 Asp Leu Gly Phe Ile Asp Gly Ser Ile Phe Leu Leu Leu Ile Thr Asn  
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 Cys Val Ser Pro Phe Ile Gly Met Ser Ser Ile Ser Asp Tyr Lys Lys

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 Trp Cys Gly Gln Ala Leu Val Asp Ile Pro Leu Tyr Phe Leu Ile Leu  
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 Phe Ser Ile His Leu Ile Tyr Tyr Phe Ile Phe Leu Gly Phe Gln Leu  
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 Ser Trp Glu Leu Met Phe Val Leu Val Val Cys Ile Ile Gly Cys Ala  
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 Val Ser Leu Ile Phe Leu Thr Tyr Val Leu Ser Phe Ile Phe Arg Lys  
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 Trp Arg Lys Asn Asn Gly Phe Trp Ser Phe Gly Phe Phe Ile Ile Leu  
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 Leu Ile Leu Cys Met Ile Phe Ile Pro Ser Phe Thr Leu Leu Gly Tyr  
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 Val Met Leu Leu Ile Gln Leu Asp Phe Met Arg Asn Leu Asp Ser Leu  
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 Asp Asn Arg Ile Asn Glu Val Asn Lys Thr Ile Leu Leu Thr Thr Leu  
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 Ile Pro Tyr Leu Gln Ser Val Ile Phe Leu Phe Val Ile Arg Cys Leu  
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 Glu Met Lys Tyr Gly Asn Glu Ile Met Asn Lys Asp Pro Val Phe Arg  
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 Ile Ser Pro Arg Ser Arg Glu Thr His Pro Asn Pro Glu Glu Pro Glu  
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 Glu Glu Asp Glu Asp Val Gln Ala Glu Arg Val Gln Ala Ala Asn Ala  
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 Leu Thr Ala Pro Asn Leu Glu Glu Glu Pro Val Ile Thr Ala Ser Cys  
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 Leu His Lys Glu Tyr Tyr Glu Thr Lys Lys Ser Cys Phe Ser Thr Arg  
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 Lys Lys Lys Ile Ala Ile Arg Asn Val Ser Phe Cys Val Lys Lys Gly  
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 Glu Val Leu Gly Leu Leu Gly His Asn Gly Ala Gly Lys Ser Thr Ser  
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 Ile Lys Met Ile Thr Gly Cys Thr Lys Pro Thr Ala Gly Val Val Val  
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 Leu Gln Gly Ser Arg Ala Ser Val Arg Gln Gln His Asp Asn Ser Leu  
                                  1265                      1270                      1275                      1280  
 Lys Phe Leu Gly Tyr Cys Pro Gln Glu Asn Ser Leu Trp Pro Lys Leu  
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Thr Met Lys Glu His Leu Glu Leu Tyr Ala Ala Val Lys Gly Leu Gly  
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 Gln His Leu Lys Asn Lys Phe Gly Arg Asp Tyr Leu Leu Glu Ile Lys  
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 Met Lys Glu Pro Thr Gln Val Glu Ala Leu His Thr Glu Ile Leu Lys  
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 Tyr Lys Leu Pro Val Glu Asp Val His Pro Leu Ser Arg Ala Phe Phe  
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 Ser Gln Ala Thr Leu Glu Gln Val Phe Leu Glu Leu Cys Lys Glu Gln  
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atgaaaagag agagcttatt g 141

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<210> 17  
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 <213> Homo sapiens

<400> 17  
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 gcattatact ttgacaaaat tttaccct 148

<210> 18  
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 <212> DNA  
 <213> Homo sapiens

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 attattitga accagtagct cctgaattcc aaggaaaaga agccatcag 169

<210> 19  
 <211> 59  
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 <213> Homo sapiens

<400> 19  
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<210> 20  
 <211> 111  
 <212> DNA  
 <213> Homo sapiens

<400> 20  
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<210> 21  
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 <212> DNA  
 <213> Homo sapiens

<400> 21  
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 agataactgg cgtctgtcct caattcaatg ttcaatttga catactcacc gtgaaggaaa 120  
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<210> 22  
 <211> 120  
 <212> DNA  
 <213> Homo sapiens

<400> 22  
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<210> 23  
 <211> 139  
 <212> DNA  
 <213> Homo sapiens

<400> 23  
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 gaggctgaca tcctggctg 139

<210> 24  
 <211> 91  
 <212> DNA  
 <213> Homo sapiens

<400> 24  
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 aaagaagggt gggctcttga taccaccta g 91

<210> 25  
 <211> 140  
 <212> DNA  
 <213> Homo sapiens

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 aaggacaaat acatttcag 140

<210> 26  
 <211> 117  
 <212> DNA  
 <213> Homo sapiens

<400> 26  
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<210> 27  
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 <212> DNA  
 <213> Homo sapiens

<400> 27  
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<210> 28  
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 <212> DNA  
 <213> Homo sapiens

<400> 28  
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 gttaaataaa aagatcgatt ggaattttta aaacgaattg ttttttctct ctcctggaca 120  
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<210> 29  
 <211> 134  
 <212> DNA  
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<400> 29  
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 ctggtaaaca aaag 134

<210> 30  
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 <212> DNA  
 <213> Homo sapiens

<400> 30  
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 aatattatca gcaatgggct acttcaaagt tttaatcaca cacaacatat tcgaattgag 120  
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<210> 31  
 <211> 108  
 <212> DNA  
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<210> 32  
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 <213> Homo sapiens

<400> 32  
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 caggcactag tggacgtcag cttcttcatt ttaattctcc ttttaatgta ttttaattttc 120  
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<210> 33  
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 <212> DNA  
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<400> 33  
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<210> 34  
<211> 120  
<212> DNA  
<213> Homo sapiens

<400> 34  
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accaccatgg tattgggtcc ttcataatcc ttgcttgat ttaaaacttt tttggaagtg 120

<210> 35  
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<212> DNA  
<213> Homo sapiens

<400> 35  
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tttctagtct gcttcata 78

<210> 36  
<211> 92  
<212> DNA  
<213> Homo sapiens

<400> 36  
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aagaaaagaa tgcgaaaaga tcctgttttc ag 92

<210> 37  
<211> 121  
<212> DNA  
<213> Homo sapiens

<400> 37  
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<210> 38  
<211> 118  
<212> DNA  
<213> Homo sapiens

<400> 38  
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<210> 39  
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<212> DNA  
<213> Homo sapiens

<400> 39  
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<210> 40  
<211> 155

<212> DNA  
<213> Homo sapiens

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ctcaggaaag cggacgcgag gctcgccatc gcaag 155

<210> 41  
<211> 76  
<212> DNA  
<213> Homo sapiens

<400> 41  
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aggaatcacg agaaag 76

<210> 42  
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<212> DNA  
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<400> 42  
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acgggcatag accccacagg gcagcagcaa atgtg 95

<210> 43  
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<212> DNA  
<213> Homo sapiens

<400> 43  
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<210> 44  
<211> 141  
<212> DNA  
<213> Homo sapiens

<400> 44  
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aaaagtgaag gaaacgtctc aagtgacttt ggtccacact gagattctga agcttttccc 120  
acaggctgca gggcaggaaa g 141

<210> 45  
<211> 80  
<212> DNA  
<213> Homo sapiens

<400> 45  
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ctttcacaaa ttagaagcag 80

<210> 46  
<211> 56  
<212> DNA  
<213> Homo sapiens

<400> 46  
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<210> 47  
<211> 369  
<212> DNA  
<213> Homo sapiens

<400> 47  
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acaatgagat ggaaactcct ccctcattca gatgaacctt aaaacctcaa acctagtaat 120  
tttttggtga tctcctataa acttatgttt tatgtaataa ttaatagtat gtttaatttt 180  
aaagatcatt taaaattaac atcagggtata ttttgtaaat ttagttaaca aatacataaa 240  
ttttaaaatt attcttcctc tcaaactatg ggggtgatagc aaacctgtga taaaggcaat 300  
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<210> 48  
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<212> DNA  
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<400> 48  
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ttcctgaga 130

<210> 49  
<211> 109  
<212> DNA  
<213> Homo sapiens

<400> 49  
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ctgcaagaac tgtctcaaaa aatggagaat gaaaagacag accttggtg 109

<210> 50  
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<212> DNA  
<213> Homo sapiens

<400> 50  
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caagttcatg acactcctca aatgtcttca atggatctgg gacgtgtaga tagttttaat 120  
gatactaatt atgttattgc atttgcacct gaatccaaaa ctaccaaga gataatgaac 180  
aaagtggctt cagccccatt cctaaaag 208

<210> 51  
<211> 165  
<212> DNA  
<213> Homo sapiens

<400> 51  
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caatagacgc agtgagagtc atctttactg ataccttctc ctaccatttg aagttttctt 120  
ggggacatag aatccccatg atgaaagagc acagagacca ttcag 165

<210> 52  
<211> 104  
<212> DNA  
<213> Homo sapiens

<400> 52  
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gctttgtagc ttttcaagct gccattaatg ctgctatcat agaa 104

<210> 53  
<211> 227  
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<213> Homo sapiens

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atattacctt ttgttgccca aggaggagtt gcaactgatt ttttcatttt cttttgcatt 120  
atttcttttt ctacatttat atactatgta tcagtcaatg ttacacaaga aagacaatac 180  
attacgtcat tgatgacaat gatgggactc cgagagtcag cattctg 227

<210> 54  
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<400> 54  
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tattgtaaaa tctgcacaaa ttgtcgtcct gactggtttt gtgatggctt tcaccctctt 120  
tctcctctat ggcctgtcct tg 142

<210> 55  
<211> 186  
<212> DNA  
<213> Homo sapiens

<400> 55  
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gtgtttctcc ttattgtcct ttgggggatc ctgggattcc cagcattgta tacacatctt 120  
cctgcatttt tggaatggac tttgtgtcct cttagcccct ttgccttcac tgttgggatg 180  
gccag 186

<210> 56  
<211> 148  
<212> DNA  
<213> Homo sapiens

<400> 56  
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tacctcataa tagctactct tttcatgttg gtttttgaca cccttctgta tttgggtatt 120  
acattatatt ttgacaaaat tttgcccc 148

<210> 57  
<211> 169  
<212> DNA  
<213> Homo sapiens

<400> 57  
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acggaagggc taatcatgtg gtccttgaga atgaaacaga ttctgatcct acacctaatt 120

actgttttga accagtgtct ccagaattct gtgggaagga agccatcag 169

<210> 58  
<211> 59  
<212> DNA  
<213> Homo sapiens

<400> 58  
aatcaaaaat cttaaaaaag aatatgcagg gaagtgtgag agagtagaag ctttgaaag 59

<210> 59  
<211> 111  
<212> DNA  
<213> Homo sapiens

<400> 59  
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<210> 60  
<211> 176  
<212> DNA  
<213> Homo sapiens

<400> 60  
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agttcactgg attttgtcca caatccaatg tgcaatttgg atttctcact gtgaaagaaa 120  
acctcaggct gtttgctaaa ataaaaggga ttttgccaca tgaagtggag aaagag 176

<210> 61  
<211> 120  
<212> DNA  
<213> Homo sapiens

<400> 61  
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ttaagtgggt gacaaaatag gaaactaact tttgggattg ccattttagg agatcctcaa 120

<210> 62  
<211> 139  
<212> DNA  
<213> Homo sapiens

<400> 62  
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aatctcctga aagaggggaa atcagacaga gtaattctct tcagcaccca gtttatagat 120  
gaggctgaca ttctggcgg 139

<210> 63  
<211> 91  
<212> DNA  
<213> Homo sapiens

<400> 63  
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agaagaaatg gggcataggc taccatttaa g 91



<210> 64  
 <211> 140  
 <212> DNA  
 <213> Homo sapiens

<400> 64  
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 aaggacaaac aaatttcag 140

<210> 65  
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 <212> DNA  
 <213> Homo sapiens

<400> 65  
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<210> 66  
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 <212> DNA  
 <213> Homo sapiens

<400> 66  
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 tctggaggca gcaggtctgt gcaatagcaa aagttcgctt cctaaagtta aagaaagaaa 180  
 gaaaaagcct gtggactat 199

<210> 67  
 <211> 167  
 <212> DNA  
 <213> Homo sapiens

<400> 67  
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 acaaccacag gatcctctga cccatttact ggtcatcaat aagacag 167

<210> 68  
 <211> 134  
 <212> DNA  
 <213> Homo sapiens

<400> 68  
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 cagtgatga aaag 134

<210> 69  
 <211> 138  
 <212> DNA  
 <213> Homo sapiens

<400> 69  
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 gatgtcatta gcaatggact acttggaatt ttttaattcgt cagaacacat tcagactgac 120  
 agaagcacat tttttgaa 138

<210> 70  
<211> 108  
<212> DNA  
<213> Homo sapiens

<400> 70  
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gcctctttca ctccatacat tgcaatgagc agcattggtg actacaaa 108

<210> 71  
<211> 174  
<212> DNA  
<213> Homo sapiens

<400> 71  
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caagcactgg tggatgtttc cctgtacttt ttgatcctcc tgctaattgca aataatggat 120  
tatattttta gcccagagga gattatattt ataattcaaa acctgttaat tcaa 174

<210> 72  
<211> 114  
<212> DNA  
<213> Homo sapiens

<400> 72  
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atttttcgca atgggagaaa aaatagtggc atttggtcatt ttttcttctt aatt 114

<210> 73  
<211> 120  
<212> DNA  
<213> Homo sapiens

<400> 73  
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<210> 74  
<211> 69  
<212> DNA  
<213> Homo sapiens

<400> 74  
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ctgctaata 69

<210> 75  
<211> 92  
<212> DNA  
<213> Homo sapiens

<400> 75  
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aagaaactaa tgagaaagga tcctgtgttc ag 92

<210> 76

<211> 121  
<212> DNA  
<213> Homo sapiens

<400> 76  
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agatatccag atggaaagaa tgagaacagt gaatgctatg gctgtgagag actttgatga 120  
g 121

<210> 77  
<211> 118  
<212> DNA  
<213> Homo sapiens

<400> 77  
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ttttctaaaa ggaagaaaaa aattgccaca agaatgtct ctttttgtgt taaaaaag 118

<210> 78  
<211> 92  
<212> DNA  
<213> Homo sapiens

<400> 78  
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taactggaga cacaaaacca actgcaggac ag 92

<210> 79  
<211> 161  
<212> DNA  
<213> Homo sapiens

<400> 79  
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<210> 80  
<211> 76  
<212> DNA  
<213> Homo sapiens

<400> 80  
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<210> 81  
<211> 95  
<212> DNA  
<213> Homo sapiens

<400> 81  
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accgggatgg accccgaggg gcagcagcaa atgtg 95

<210> 82  
<211> 120  
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<213> Homo sapiens

<400> 82

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<210> 83

<211> 141

<212> DNA

<213> Homo sapiens

<400> 83

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gaagctgaag aacctggcac aaatggagcc cctccatgca gagatcctga ggcttttccc 120  
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<210> 84

<211> 80

<212> DNA

<213> Homo sapiens

<400> 84

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tttcttcaaa ttagagatag 80

<210> 85

<211> 56

<212> DNA

<213> Homo sapiens

<400> 85

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<210> 86

<211> 1062

<212> DNA

<213> Homo sapiens

<400> 86

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 aatttgctaa cattgatttt ttatttttctt tcctgaaata gcttatttcc taaaatgaaa 240  
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 <213> Homo sapiens

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 cacagaccat ggcttttcag aagccaagct gaataaaaaac agtttttaaaa gaggcaacca 180  
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gtttctttct cttcttttat atactttgca tcattaaatg ttgcaaggga aagaggaaaa 180  
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<213> Homo sapiens

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